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DIGITIZATION OF ROMAN COIN FINDS FROM THE SOUTH-WESTERN UKRAINE: AFE-UKR DATABASE

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Abstract: The article introduces the recently created database *Ancient Coin Finds in Europe: Ukraine (AFE-UKR)*, with a focus on the finds of Roman coins from South-Western Ukraine, entered into the database. These are 923 coins stored in the Odesa Archaeological Museum, Izmail Local History Museum of the Lower Danube region, National Museum of the History of Ukraine, and a private collection. The coins were discovered accidentally or during the archaeological excavations of several sites in Odesa, Mykolaiv, and Vinnytsia regions of Ukraine. The database includes Republican and Imperial issues, Roman provincial coins, and the coins of states under the Roman protectorate, spanning from 49 BC to 408 AD. Most of these findings illustrate the circulation of Roman coins in the ancient centers and their surroundings. The lesser part of coin findings belonged to barbarians, primarily the Goths and Sarmatians.

AFE-UKR database is a part of *Antike Fundmünzen in Europa (AFE-RGK)* project. It is based on Linked Open Data methodologies. At the moment, it consists primarily of coins from museum collections, but plans include incorporating all available data on Roman coin findings from publications and web resources to create a comprehensive database of Roman coin finds in Ukraine, facilitating further study of their circulation.

Keywords: *Linked Open Data, Ancient Coins Found in Europe (AFE-RGK), North-Western Black Sea region, Roman denarii, Roman provincial coins.*

INTRODUCTION

The last decade is marked with active development of numismatic studies employing digital technologies, which can provide convenient tools for studying the typology of coins, their weight standard, die-links studies, the geographical distribution of coin finds, etc. One of the areas of digital numismatics is the recording coin finds by setting up a database, based on Linked Open Data (LOD) methodologies, which provide its interoperability with other web databases within the framework of *Nomisma.org* ontology¹.

This paper aims to present the main results and prospects of the work on the project *Finds of Roman coins in the South of Ukraine: digitalization of museum collections*². This project was aimed at digitization of finds of Roman coins stored in the museums of Southern Ukraine that were under threat of being destroyed with the start of a full-scale invasion of Russia. The project

¹ GRUBER 2022, 13–16.

² This project was financed by the German Archeological Institute within the framework of a research scholarship *Documenting, Recording and Saving Ukrainian Archeological Heritage*.

focused on the coins from museum collections, although some coin finds of particular importance from private collections were also included.

The project was implemented within the framework of the database *Ancient Coin Finds in Europe: Ukraine (AFE-UKR)* (hereinafter – the database)³. It was developed by the Roman-German Commission of the German Archaeological Institute (RGK DAI) (curator: Dr. David Wigg-Wolf) in coordination with the Laboratory of Archeology of Eastern Europe at the University of Warsaw (curator: dr hab. Kyrylo Myzgin). Technical support is provided by Frankfurt Big Data Lab at Goethe University (director: Dr. Karsten Tolle).

AFE-UKR is a part of *Antike Fundmünzen in Europa (AFE-RGK)* database. It employs LOD methodologies, established by the *Nomisma.org* project, which facilitates the logical integration with different databases, such as *Online Coins of the Roman Empire (OCRE)*⁴. Previously projects for recording finds of ancient coins from Germany⁵, Poland,⁶ and Hungary⁷ were developed within the *AFE-RGK*.

The database provides a possibility to search coins by findspot, and coin details, such as material, denomination, issuer, portrait (in case it was issued for other members of the imperial family), mint, date from/to, reference work, peculiarities of production (e.g. double strike, hybrid, plated), secondary treatment (e.g. halved, pierced, cut up, bent), description of obverse and reverse, remarks, and status (official or imitation).

At the moment, the database includes data on finds of Roman coins from the territory of South-Western Ukraine (923 entries, made by the author of this paper), and Western Ukraine (900 entries, made by the director of the local history museum of Slovita N. Demskiy).

FINDS FROM SOUTH-WESTERN UKRAINE IN AFE-UKR DATABASE

The territory of South-Western Ukraine, often referred to as the North-Western Black Sea region, is represented in the database by finds of Roman coins stored in the Odesa Archaeological Museum of the National Academy of Sciences of Ukraine (hereinafter – OAM), Izmail Local History Museum of Lower Danube region, National Museum of the History of Ukraine, and from a private collection.

The largest number of coins present in the database is stored in OAM. Ancient coins started to replenish the collection of this museum since its foundation in 1825 (known at that time as the City Museum of Antiquities, and since 1839 – the Museum of the Odessa Imperial Society of History and Antiquities). During World War II, all numismatic documentation of the museum was lost, so there is almost no information about the origin of coins. However, by comparison with old publications, the origin of some coins was managed to be established, with varying degrees of probability. In terms of Roman coins, these are 12 coins of Tyras from the Museum of Fine Arts at the Imperial Novorossiysk University in Odesa,

which were transferred to OAM in 1924, and 2 coins of Tyras probably found on the Snake Island (Zmiinyi Island). The collection of the Museum of Fine Arts was formed by donations from various sponsors⁸. The coins of Tyras from this museum were probably discovered in Akkerman (nowadays Bilhorod-Dnistrovskiy, where the ancient city of Tyras was located) or its surroundings.

The probable origin of the coins from Snake Island was detected by their comparison with the drawings made by N.N. Murzakevich, stored in the OAM archive. In addition to these coins discovered in the 1840s – early 1850s, the collection of OAM contains one Roman provincial coin found on the Snake Island during the archaeological excavations in 1968⁹.

After World War II, the OAM received coins from the archaeological excavations of various sites, located mostly in the Odessa region. The largest number of coins (668 pcs.) came from the excavations of Tyras during 1963–2017. Coins found during 1963–2002 have been published in several articles¹⁰. All coins of the 5th century BC – 5th century AD found during the excavations of Tyras are planned to be published in a monograph by S. Bulatovich, L. Nosova, and T. Samoylova¹¹.

Apart from Tyras, the OAM received Roman coins found during the archaeological excavations of such sites in the Odesa region as Orlivka/Kartal¹², Nikonion¹³, Mologa¹⁴, Mayaki¹⁵, Holms'ke¹⁶, as well as during archaeological survey near the village of Stratiivka in Vinnytsia region¹⁷. Also, one coin of Philip the Arab was donated to the museum by a resident of the village of Ivashkiv (Kodymsky district, Odessa region)¹⁸.

The Izmail Local History Museum of the Lower Danube region has one Roman coin with the known place of discovery – a copper piece minted in ca. 348–355, found on Orlivka/Kartal settlement along with 3 ancient Greek coins. These coins were donated to the museum in 1998 by a resident of Ismail.

A collection of ancient and medieval coins, owned by a resident of Bilhorod-Dnistrovskiy V. Grinkovskiy, is now kept in the National Museum of the History of Ukraine. V. Grinkovskiy collected coins discovered in Bilhorod-Dnistrovskiy and its surroundings, and in 1992 donated his collection to the museum. The collection includes 44 coins of Tyras minted during the Roman period, which were published by L. Vakulenko and Z. Zraziuk¹⁹.

⁸ BULATOVICH 2017, 7–14.

⁹ BULATOVICH/NOSOVA 2021, 7–17; BULATOVICH 1971, 212–225.

¹⁰ KARYSHKOVSKY/KOTSIEVSKIY 1979, 88–98; BULATOVICH 1989, 81–89; NOSOVA 1996, 157–159; BULATOVICH/NOSOVA 2010, 147–173.

¹¹ BULATOVICH/NOSOVA/SAMOYLOVA. A brief overview of the catalog was presented in 2016 – BULATOVICH/NOSOVA 2016, 15–17.

¹² BONDAR/BULATOVICH 2001–2002, 65–72; BRUYAKO/NOSOVA 2010, 65–72; BRUIAKO *et alii* 2017, 51–71; BRUYAKO/NOSOVA 2021, 38–54; NOSOVA/BRUYAKO 2022, 55–69.

¹³ ZAGINAYLO 1966, 113–114; SEKERSKAYA/BULATOVICH 2010, 32–33.

¹⁴ KARYSHKOVSKY 1985, 182.

¹⁵ PATOKOVA/DZIGOVSKIY/ZIN'KOVSKIY 1982, 134.

¹⁶ STOLYARIK 1986, 219–221; DERGACIOVA 2021, 118–186.

¹⁷ BRAICHEVSKIY 1959, 51, № 307.

¹⁸ KARYSHKOVSKY 1971, 83.

¹⁹ VAKULENKO/ZRAZIUK 2016, 153–160.

³ AFE-UKR. Currently not open-access, but it will be fixed.

⁴ AFE-RGK.

⁵ AFE-RGK.

⁶ AFE-PL.

⁷ AFE-HU.

A hoard of 10 Roman denarii dated to 65–164 AD, stored in a private collection, was published by V. Stolba and U. Peter. This hoard was found accidentally in the area to the west of Adjigol arroyo, between the villages of Dmitriivka and Ivanivka (Ochakov district, Mykolaiv region). Most probably, it was found on the ancient settlements Petukhovka 2 or Yaselka, which was a part of Olbian *chora*²⁰.

Most of the coins included to the database are single finds discovered during archaeological excavations, or found by private persons. There are also two hoards, found in Holms'ke and Olbian *chora*. In addition to single finds and hoards, the database contains a few coins found in burials. 5 Roman denarii minted in 32 BC–192 AD were found in the Sarmatian burial dated to the late 2nd – early 3rd centuries AD, unearthed near Kartal/Orlivka settlement in 2017²¹. 2 Roman provincial coins were discovered in a burial during the excavations of Nikonion in 1994²², and 1 cast copy of denarius was found in a Sarmatian burial near the village of Mayaki in 1975²³.

The main part of the coins entered to the database reflects the currency circulation among the population of the ancient centers of the North-Western Black Sea region and their surroundings: these are the Greek and Hellenized late Scythian inhabitants of Tyras, Nikonion, Mologa, Olbian *chora*, the multi-ethnic population of the Roman *castel* in Orlivka (except for later coins mentioned below). This group also includes finds from the Snake Island, where the temple of Apollo was located.

The second, much lesser group of coin finds, is associated with the barbarian population appeared in the North-Western Black Sea region with several migration waves during the 3rd – 4th centuries AD. This group includes coins from two Sarmatian burials in Orlivka and Mayaki, a hoard from the Chernyakhiv settlement near the village of Holms'ke, and single finds from Tyras, Orlivka (since the mid-3rd century AD, when barbarian population settled on these sites), Stratiivka and Ivashkiv.

All coins in the database can be roughly divided into three groups: 1. Roman Republican and Imperial issues; 2. Roman provincial issues; 3. Coins of states under the Roman protectorate.

The first group is represented by copper (quadranses, dupondii, ases, sestertii) and silver denominations (denarii, antoniniani, siliquae), minted in Rome and other imperial mints.

The finds of Roman Republican coins are not common in the North-Western Black Sea region. The database contains five silver denarii, issued during 49–31 BC. Of these, one piece came from Tyras²⁴, the rest from Orlivka²⁵. In addition to these coins, a group (probably a hoard) of 17 Republican denarii dated to 138–74 BC from a private collection, discovered near Orlivka settlement, should be mentioned²⁶. Thus, the finds of Republican denarii concentrate

in the Lower Danube region. In the neighboring Dobruja region, the finds of these coins are known in rather large quantities²⁷. One of the Republican denarii from Orlivka was found in a Sarmatian burial of the late 2nd – early 3rd centuries AD²⁸. The context of other finds from this site is unknown. They can be attributed to either Geto-Dacian (ca. mid-1st century BC – mid-1st AD) or to the early Roman period of the history of this settlement (since the second half of the 1st century AD)²⁹.

Roman coins minted during the late 1st century BC – late 1st century AD are represented in the database by the issues of Augustus (27 BC–14AD), Tiberius (14–37), Caligula (37–41), Claudius (41–54), Nero (54–68), Otho (69), Vespasian (69–79), Titus (79–81), Domitian (81–96), and Nerva (96–98). Among them, copper denominations (dupondii, ases, sestertii) predominate over silver denarii. Most of the copper coins of the Julio-Claudian dynasty found in Tyras have the countermarks of this city³⁰.

The coins of the 1st century AD found in Orlivka account for a significant part (ca. 28%) of all finds of Roman coins from this site³¹.

Starting from the late 1st century AD, there is a noticeable increase in the influx of Roman coins into the ancient centers of the North-Western Black Sea region (Tyras and its *chora*, Nikonion, Orlivka). The largest number of coins in the database dates to the reigns of Trajan (98–117), Hadrian (117–138), Antoninus Pius (138–161), Marcus Aurelius (161–180), and Septimius Severus (193–211). In the late 1st – 2nd centuries AD, the Roman Empire flourishes, and the intensity of trade between the North-Western Black Sea centers and other regions of the Roman Empire increases³². Among the coins of the late 1st – early 3rd centuries AD, silver denarii predominate over copper Senate issues.

The database contains 52 copper copies of silver denarii issued on behalf of Vespasian (69–79), Titus (79–81), Domitian (81–96), Nerva (96–98), Trajan (98–117), Hadrian (117–138), Antoninus Pius (138–161), Marcus Aurelius (161–180), Septimius Severus (193–211), Elagabalus (218–222), and Severus Alexander (222–235). Due to the poor preservation of some of these coins, it is hard to visually determine whether they were struck or cast, and whether they had silver plating or not, being produced to circulate as small copper denominations.

Starting from the reign of Caracalla (211–217), the influx of Roman coins into the North-Western Black Sea centers noticeably decreased, although Tyras continued minting its own coins till 228 AD³³.

During the 230–260s the ancient settlements of the North-Western Black Sea region were exposed to the raids of various barbarian tribes, with the Goths having played a leading role. The Roman *castellum* in Orlivka might have been abandoned by Roman troops for some time after the barbarian campaign in the 230s, but finally ceased to exist after

²⁰ STOLBA/PETER 2021, 223–232.

²¹ BRUYAKO/NOSOVA 2021, 38–54.

²² SEKERSKAYA/BULATOVICH 2010, 33.

²³ PATOKOVA/DZIGOVSKIY/ZIN'KOVSKIY 1982, 134.

²⁴ BULATOVICH/NOSOVA 2016, 17.

²⁵ BONDAR'/BULATOVICH 2001–2002, 177; BRUYAKO/NOSOVA 2021, 38–54.

²⁶ MYZGIN 2018, 87–94.

²⁷ BULATOVICH 2013, 743.

²⁸ BRUYAKO/NOSOVA 2021, 38–54.

²⁹ BONDAR'/BULATOVICH 2001–2002, 174; MYZGIN 2018, 88–89.

³⁰ NOSOVA 2014, 319.

³¹ BONDAR'/BULATOVICH 2001–2002, 177–178.

³² BULATOVICH 2013, 744, 753.

³³ BULATOVICH 2013, 746.

the reign of Trajan Decius. The finds of coins of Gallienus (253–268) and Constantius II (337–361) fall on the post-Roman period of this site and are attributed to the presence of a barbarian population here³⁴.

Nikonion was abandoned in the mid-3rd century AD as a result of barbarian raids³⁵. A few finds of antoniniani of Gordian III (238–244) and Philip the Arab (244–249) indicate the final stage of the history of this settlement³⁶. No Roman coin of a later period has been recorded here so far.

Tyras was hardly damaged by one of the barbarian raids, no later than 269. However, life in the city had not ceased completely. Archaeological finds indicate the barbarization of the city's population in the mid-3rd century AD. Nevertheless, the previous traditions of ancient civilization still affected the architecture and everyday life. Trade connections with the Black Sea and Mediterranean centers were also preserved³⁷.

During barbarian invasions and the following period of stabilization, i.e. in the mid-3rd – early 4th centuries, the influx of Roman coins to Tyras continued, although this time it was noticeably weaker in contrast to the late 1st – early 3rd centuries AD. Coins issued during the reigns of Maximinus Thrax (235–238), Gordian III (238–244), Philip the Arab (including issues for Philipp II and Otacilia Severa) (244–249), Trajan Decius (including issues for Hostilian and Herennius Etruscus) (249–251), Valerian (including issues for Cornelia Salonina) (253–260), Gallienus (253–268), Claudius II Gothicus (268–270), Aurelian (270–275), Diocletian (284–305), Licinius (308–324) and Constantine I (306–337) were recorded among the finds from this city³⁸. Coins minted during 268–337, present in the database, were found exclusively in Tyras. However, several single finds of coins of this period from the North-Western Black Sea region were recorded in private collections³⁹.

In 332, Constantine I concluded a peace treaty with the Goths, which facilitated the influx of Roman coins to Barbaricum. A noticeable increase in recorded coin finds falls on the reign of Constantius II (337–361). The database contains 93 silver siliquae of his reign from Holms'ke hoard, and also copper coins from Tyras (3 pcs.) and Orlivka (9 pcs.)⁴⁰. Coins of this period, especially copper ones, arrived to Barbaricum in rather large numbers as a result of trade relations. Probably they were also brought by the barbarians who returned home after serving in the Roman army⁴¹.

As regards Holms'ke hoard, coins from its composition, as well as other similar hoards found in the Republic of Moldova and South-Western Ukraine, might be a reflection of a mass one-time inflow of silver siliquae to Barbaricum, as a result of Procopius' payment to Goths mercenaries for supporting him against Valens in 365⁴².

After Valens' campaigns against the Goths in 367–369,

the Roman trade with the Gothic tribes was sharply reduced, which led to a significant decrease in the influx of Roman coins to the North-Western Black Sea region. This influx almost stopped after the invasion of the Huns in 376⁴³. The database contains a few coin finds of this period from Tyras, issued during the reign of Julian the Apostate (361–363), Jovianus (363–364), Valentinian I (364–375), Valentinian II (388–392), Theodosius I (issues for Arcadius and Aelia Flacilla) (379–395), and Arcadius (395–408)⁴⁴.

The second group (Roman provincial coins) is predominantly represented by the issues of Tyras. This polis started issuing coins in the 4th century BC. In the 1st century BC, minting coins in Tyras was discontinued, having been resumed in the 1st century AD with the issue of copper coins bearing the portrait of an unidentified Roman emperor and the legend KAICAPOC CEBACTOY on the obverse. For a long time, these coins had been considered non-authentic, until they were found during archaeological excavations in 1940. The researchers date this issue differently – from Augustus to Vespasian⁴⁵. Regular minting in Tyras started during the reign of Domitian, when the city was incorporated into the Roman province of Moesia Inferior. It was ceased during the reign of Severus Alexander, in 228 AD⁴⁶.

During archaeological excavations of Tyras, a significant number of coins of this city were found. These finds include almost all known types of Tyras of the Roman period. The largest number of coins dates to the reigns of Domitian (81–96), Hadrian (117–138), and Antoninus Pius (138–161)⁴⁷.

In contrast to the autonomous period of minting in Tyras during the 4th – 1st centuries BC, the Roman period is represented exclusively by copper denominations. From the late 1st century AD to the late 2nd century AD small denominations (dupondius, assarius, trihemiasarius (since Antoninus Pius), and tressis (since Commodus)) predominated among the coins of Tyras, while during the reign of the Severan dynasty (193–235), large denomination of tetrassarius prevailed.

Tyras' coins of the Roman period were discovered not only in this city. The database includes finds of such coins from Mologa⁴⁸, Nikonion,⁴⁹ and Snake Island⁵⁰.

Apart from the issues of Tyras, the database includes Roman provincial coins from various centers, both from the provinces close to the North-Western Black Sea region: Moesia (Markianopolis, Nikopolis ad Istrum, Viminacium), Thrace (Byzantium, Deultum, Hadrianopolis, Istros, Odessos, Perinthos, Phillipopolis, Serdica, Tomis), Dacia, Macedonia (Koinon of Macedonia, Thessalonica), and from more distant Asia Minor regions: Bithynia (Nicaea, Nicomedia, Heraclea Pontica), Mysia (Parion), Troas (Alexandria), Ionia (Miletus), Cappadocia (Caesarea), and Isaura (Cilicia).

These coins were issued during the reigns of Caligula (37–41), Domitian (81–96), Trajan (98–117), Hadrian

³⁴ NOSOVA/BRUYAKO 2022, 63.

³⁵ BRUYAKO/DZIGOVSKIY/SEKERSKAYA 2008, 184–185.

³⁶ SEKERSKAYA/BULATOVICH 2010, 33.

³⁷ KARYSHKOVSKY/KLEYMAN 1985, 131–137; SAMOYLOVA 2013, 491.

³⁸ BULATOVICH 2013, 746–747.

³⁹ STOLYARIK 1992, 22–24.

⁴⁰ STOLYARIK 1986, 219–221; DERGACIOVA 2021, 118–186; BRUYAKO *et alii* 2017, 65–66; NOSOVA/BRUYAKO 2022, 65.

⁴¹ MYZGIN 2008, 57–59; MYZGIN 2024.

⁴² DERGACIOVA 2021, 156.

⁴³ STOLYARIK 1992, 72–73.

⁴⁴ NOSOVA/BULATOVICH 2010, 153; BULATOVICH 2013, 747.

⁴⁵ See the history of study in NOSOVA 2014, 317–318.

⁴⁶ BULATOVICH 2013, 745–746.

⁴⁷ KARYSHKOVSKY/KOTSIEVSKIY 1979, 89–90; BULATOVICH 2013, 745–746.

⁴⁸ KARYSHKOVSKY 1985, 182.

⁴⁹ SEKERSKAYA/BULATOVICH 2010, 27–38.

⁵⁰ BULATOVICH/NOSOVA 2021, 7–17.

(117–138), Antoninus Pius (138–161), Commodus (180–192), Septimius Severus (including issues for Julia Domna, Geta, Caracalla, and Plautilla) (193–211), Caracalla (211–217), Diadumenian (218), Elagabalus (218–222), Severus Alexander (222–235), Gordian III (238–244), Philip the Arab (244–249), Valerian (253–260), and Gallienus (253–268). The vast majority belongs to the reign of Septimius Severus (ca. 45% of all provincial coins with identified issuer). The flourishing of provincial copper coinage during his reign might have been related to the need for small change in circulation, which was not met by the insufficient minting of copper denominations in Rome⁵¹. Among the provincial coin finds, the vast majority (ca. 92%) are copper. Silver issues are represented only by the drachms and hemidrachms of Caesarea in Cappadocia⁵².

The finds of provincial coins included in the database were discovered mostly in Tyras and Orlivka. There are also a few finds from Nikonion (3 pcs.)⁵³ and the Snake island (1 pc.)⁵⁴.

As regards provincial coins minted until barbarian invasions, i.e. no later than 235, they probably came to North-Western Black Sea centers due to the developed network of trade connections of this region with other provinces of the Roman Empire, and also due to the presence of Roman troops in this region. A coin of Gallienus minted in Parion, found in Orlivka, is probably related to the naval campaigns of barbarian tribes in Asia Minor in the late 260s, because at that time this site had been already abandoned by Roman troops⁵⁵. As for a few finds of provincial coins from Tyras, minted during 238–268, the reason for their appearance in this city requires further thorough research.

In addition to Roman provincial coins, the so-called pseudo-autonomous issue of Hadrianopolis found in Orlivka can also be included in the second group. This coin with the head of Hercules on the obverse is dated presumably to the first half of the 3rd century AD⁵⁶.

The third group includes the coins of states that recognized the Roman protectorate, but kept their own minting: the Odrysian Kingdom, the Bosporan Kingdom, Olbia, and Tauric Chersonesos. All coins of this group in the database were found in Tyras. Coins of the Bosporan and Odrysian kingdoms, as well as Olbia, have appeared in Tyras since the 4th century BC, while the coins of Tauric Chersonesos – since the 2nd century BC. Subsequently, the coins of these centers, already being under the Roman protectorate, continued arriving in Tyras. The inventory of finds from this site includes coins of the Odrysian Kingdom minted during ca. 12 BC – 36 AD, Olbia (ca. 50–211 AD), Tauric Chersonesos (161–180 AD), and the Bosporan Kingdom (ca. 14–337 AD)⁵⁷.

Coins of the Odrysian kingdom played a significant role in the currency circulation in Tyras during the late 1st century BC – mid-1st century AD. Some of them bear countermarks

of this city with the letters TYP, AP, and a male portrait with a bandage on a head⁵⁸.

The coins of Olbia under the Roman protectorate (mid-1st – 1st half of the 3rd centuries AD) kept the minting traditions of the previous Hellenistic period. However, starting from the reign of Septimius Severus, the portraits of emperors and members of the imperial family appeared on Olbian coins, so they acquired typical features of Roman provincial issues. One such coin with the portrait of Julia Domna was found in Tyras⁵⁹.

CHALLENGES IN DIGITIZING COIN FINDS FROM UKRAINE

At the moment most finds of coins from Ukraine remain inaccessible for studying. First of all, this concerns unpublished coins found by private individuals. As regards publications of finds from private collections, often these data can hardly be correlated with the current location of a coin. In some cases, this also applies to coins stored in museums: when coins were published with a wrong inventory number, or when an inventory number was not mentioned at all⁶⁰. If all museum documentation was lost, as was the case with OAM during World War II, the identification of the origin of coins is possible only in exceptional cases⁶¹.

These circumstances can cause some difficulties in the process of digitizing data from publications. There might be a duplication of data, because a coin can be published several times, and sometimes with different attribution. The absence of a standard for describing a coin also creates difficulties in entering data to the database: often publications lack high-quality images or reference to the catalogues; there might be incorrect or inaccurate attribution, or erroneous descriptions of obverse and reverse.

Therefore, an important condition for creating a high-quality database is the ability to work with a coin directly. Unfortunately, during Russia's full-scale invasion, a lot of Ukrainian museums are not able to provide access to coins, because they might have been packed for evacuation, or due to a lack of museum employees who could select the required coins and provide the researcher with the necessary conditions for working with them.

Given that the quality of data may differ depending on whether they were entered from either a publication, a photo, or a coin itself, AFE-RGK has such a category as *Coin / Photo / Literature*, designated with the letters *c*, *p*, or *l*, respectively.

Apart from working with the publications of coins and the coins themselves, sometimes one has to compare obtained data with the museum inventory books and the reports of archaeological excavations, especially when dealing with a large number of coin finds. In publications of a complex of coin finds from one site, some coins may be mistakenly missing.

In addition to detecting errors in museum documentation

⁵¹ GÁZDAC 2004, 71–72; NOSOVA/BRUYAKO 2022, 57–59.

⁵² BULATOVICH 1989, 87, 77; BULATOVICH/NOSOVA 2010, 170, 194.

⁵³ ZAGINAYLO 1966, 114, 119; SEKERSKAYA/BULATOVICH 2010, 37.

⁵⁴ BULATOVICH 1971, 225.

⁵⁵ NOSOVA/BRUYAKO 2022, 62.

⁵⁶ NOSOVA/BRUYAKO 2022, 63–64.

⁵⁷ BULATOVICH/NOSOVA 2016, 17.

⁵⁸ KARYSHKOVSKY/KLEYMAN 1985, 89; NOSOVA 2014, 318.

⁵⁹ BULATOVICH 1989, 85.

⁶⁰ The process of compilation of necessary documents for accepting objects for permanent storage in the museum can take some time, so the coins might be published before the assignation of inventory numbers.

⁶¹ BULATOVICH/NOSOVA 2021, 7–17.

and publications, it is necessary to correct those errors made by a person who entered data. Digital methods for detecting possible errors in numismatic databases were described by K. Tolle and D. Wigg-Wolf⁶².

CONCLUSIONS AND PERSPECTIVES

Digitization of finds of Roman coins stored in Ukrainian museums is an important component in preserving the cultural heritage of Ukraine threatened by the war. Apart from that, the *AFE-UKR* database is a huge contribution to ancient numismatic studies in Ukraine. It provides a possibility to study coin finds using the entire set of methods developed by leading specialists in digital numismatics. Similar databases on finds of ancient coins from the territory of Germany, Poland and Hungary, based on LOD methodologies, are examples of how the digitization of coin finds contributes to the development of numismatic research.

At the moment, the *AFE-UKR* database primarily includes coins from the collections of museums. The next stage is entering all available data on coin finds to the database from publications and open web resources. Eventually, the database should represent all recorded finds of Roman coins from the territory of Ukraine, thus significantly promoting further studies on their circulation.

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⁶² TOLLE/WIGG-WOLF 2020, 193–201.

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